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SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/A62,742	06/05/95	ZHONG	0756-1099

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2010 CORPORATE RIDGE SUITE 600  
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D1M1/0426

EXAMINER	
RADOMSKY, L	
ART UNIT	PAPER NUMBER
1104	

DATE MAILED:

04/26/96

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents

A shortened statutory period for response to this action  
is set to expire three months(s), or thirty days,  
whichever is longer, from the date of this communication.

<b>Office Action Summary</b>	Application No. <b>08/462,742</b>	Applicant(s) <b>Zhang et al.</b>
	Examiner <b>Leon Radomsky</b>	Group Art Unit <b>1104</b>

☒ Responsive to communication(s) filed on Feb 16, 1996

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

#### Disposition of Claims

☒ Claim(s) 3-12 and 14-25 is/are pending in the application.

Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 3-12 and 14-25 is/are rejected.

☐ Claim(s) \_\_\_\_\_ is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

#### Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

#### Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). \_\_\_\_\_

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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**Part III DETAILED ACTION**

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior office action.

***Claim Rejections - 35 USC § 112***

1. Claim 21 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 20 was amended to overcome the 35 USC 112 rejection, while claim 21, which was rejected in Paper No.5 for the same reason as claim 20, was not amended.

***Claim Rejections - 35 USC § 103***

2. Claims 3-8, 11-12, 14-25 are rejected under 35 U.S.C. § 103 as being unpatentable over Oka (JP '915) in view of Liu et al. (US 826). Oka teaches to form an amorphous Si (a-Si) layer on a glass substrate by PECVD (thus incorporating some hydrogen into said a-Si) (Page 6), selectively forming a Ni layer (Page 14 of translation) on said a-Si in seed regions outside the regions slated to become TFT active regions, such that Ni does not diffuse into said active regions by abnormal diffusion (i.e. Ni is introduced into the seed regions by solid state diffusion, Page 7), and thermally crystallizing said a-Si at 550 °C, where the grain nuclei originally form in the seed regions and grain

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growth proceeds from said seed regions parallel to the substrate surface and TFT charge carrier flow (Fig. 5-8). TFTs are subsequently formed in the crystal growth region. Oka does not teach to purposely leave any areas amorphous.

Liu teaches that regions of a-Si on Corning 7059 glass which were not treated with Ni prior to a low temperature thermal treatment remain amorphous, while a-Si regions which were treated with Ni crystallized into polysilicon after said thermal treatment (Example 2), and that this selective crystallization of certain regions is advantageous because it allows simultaneous formation of driver TFTs which require high mobility in the polysilicon regions and pixel TFTs, which require a low leakage current in the amorphous regions (Col. 3, Lines 10-17).

Therefore, it would have been obvious to one of ordinary skill in the art to leave first regions of Oka amorphous by not providing a seed region in the vicinity of said first regions while crystallizing second regions in order to simultaneously form driver TFTs which require high mobility in the polysilicon regions and pixel TFTs, which require a low leakage current in the amorphous regions, as taught by Liu. The specific Ni concentration is obvious because it is a matter of determining optimum reaction conditions by routine experimentation with a limited number of species (i.e. a sufficient concentration to obtain catalytic action without inducing abnormal metal

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diffusion, as taught by Oka). See In Re Jones, 162 USPQ 224. Also see In Re Aller, 105 USPQ 233 (the selection of optimum ranges within prior art general conditions) and In Re Boesch, 205 USPQ 215 (discovery of optimum value of result effective variable in known process is ordinarily within skill of art).

3. Claims 9-10 are rejected under 35 U.S.C. § 103 as being unpatentable over Oka in view of Liu as applied to claims 3-8, 11-12, 14-25 above, and further in view of Yonehara (US '093) or Shibata (US '224 or JP '224). Oka and Liu do not teach irradiating the polysilicon after the thermal crystallization.

Yonehara and Shibata teach that irradiating the polysilicon after a thermal crystallization improves its properties, such as mobility.

Therefore, it would have been obvious to one of ordinary skill in the art to irradiate the polysilicon of Oka and Liu after the thermal crystallization in order to improve its mobility, as taught by Yonehara or Shibata.

#### **Response to Amendment**

4. Applicant's arguments with respect to all claims have been considered but are deemed to be moot in view of the new grounds of rejection.

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5. Applicant's arguments and amendments have been deemed sufficient to overcome all previous rejections of claims under 35 USC 102 and 103 and rejections of all claims except claim 21 under 35 USC 112. Said rejections are withdrawn.

### Conclusion

6. In order to ensure full consideration of any amendments, affidavits or declarations, or other documents as evidence of patentability, such documents **must** be submitted in response to this Office action. Submissions after the next Office action, which is intended to be a final action, will be governed by the requirements of 37 C.F.R. § 1.116, which will be strictly enforced.

This office action has been created under the Patent and Trademark Office Semiconductor Technology Quality Assurance Pilot Program. It incorporates the examination quality standards set as a result of customer focus sessions with the semiconductor industry. The listing of the field of search to follow is one of these standards.

Field of Search	Date
U.S. Class and subclass: 437/21, 40TFT, 41TFT, 88, 99, 101, 109, 174, 233 148/DIG. 16, DIG. 150	10/2, 3, 5 /95
Other Documentation:	
Electronic data base(s): USPAT JPOABS INSPEC	9/28/95 AND 10/2/95

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Leon Radomsky** whose telephone number is (703) 305-3445.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661. Group 1100 fax number is (703) 305-3600.

LR

4/12/96

*Charles L. Bowers Jr.*  
CHARLES L. BOWERS JR.  
SUPERVISORY PATENT EXAMINER  
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